ABSTRACT OF THE DISCLOSURE

A micromechanical resonator device and a micromechanical device utilizing same are disclosed based upon a radially or laterally vibrating disk structure and capable of vibrating at frequencies well past the GHz range. The center of the disk is a nodal point, so when the disk resonator is supported at its center, anchor dissipation to the substrate is minimized, allowing this design to retain high-Q at high frequency. In addition, this design retains high stiffness at high frequencies and so maximizes dynamic range. Furthermore, the sidewall surface area of this disk resonator is often larger than that attainable in previous flexural-mode resonator designs, allowing this disk design to achieve a smaller series motional resistance than its counterparts when using capacitive (or electrostatic) transduction at a given frequency. Capacitive detection is not required in this design, and piezoelectric, magnetostrictive, etc. detection are also possible. The frequency and dynamic range attainable by this resonator makes it applicable to high-Q RF filtering and oscillator applications in a wide variety of communication systems. Its size also makes it particularly suited for portable, wireless applications, where, if used in large numbers, such a resonator can greatly lower the power consumption, increase robustness, and extend the range of application of high performance wireless transceivers.